[7590-01-P]

NUCLEAR REGULATORY COMMISSION

[Docket No. 50-335; NRC-2011-0194]

Florida Power & Light Company

St. Lucie Plant, Unit No. 1

Exemption

1.0 Background

The Florida Power & Light Company (FPL, the licensee) is the holder of Renewed Facility Operating License No. DPR-67, which authorizes operation of St. Lucie Plant, Unit No. 1 (St. Lucie, Unit 1). The license provides, among other things, that the facility is subject to all rules, regulations, and orders of the Nuclear Regulatory Commission (NRC, or the Commission) now or hereafter in effect. The facility consists of two pressurized-water reactors located in Jensen Beach, Florida. However, this exemption is applicable only to St. Lucie, Unit 1.

By letter dated December 15, 2010, FPL submitted a License Amendment Request (LAR) to increase the licensed core power level for St. Lucie, Unit 1, from 2700 megawatts thermal (MWt) to 3020 MWt. As part of the LAR, the licensee also proposed a revision of the pressure-temperature (P-T) operating limits for St. Lucie, Unit 1.

The above LAR referenced a topical report that stated that the proposed methodology for the P-T curves did not meet some of the requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Appendix G, thus requiring an exemption pursuant to 10 CFR 50.12. By letter dated March 3, 2011, the licensee responded to a request for additional information to the above LAR and also submitted a request for the subject exemption.

2.0 Request/Action

Part 50 of 10 CFR, Appendix G, "Fracture Toughness Requirements," which is invoked by 10 CFR 50.60, requires that P-T limits be established for the reactor coolant pressure boundary during normal operating and hydrostatic or leak rate testing conditions. Specifically, 10 CFR Part 50, Appendix G, Section IV.A.2, states that "[t]he appropriate requirements on both the pressure-temperature limits and the minimum permissible temperature must be met for all conditions," and "[t]he pressure-temperature limits identified as 'ASME [American Society for Mechanical Engineers] Appendix G limits' in Table 3 require that the limits must be at least as conservative as limits obtained by following the methods of analysis and the margins of safety of Appendix G of Section XI of the ASME Code [Boiler and Pressure Vessel Code]." The regulations in 10 CFR Part 50, Appendix G also specify the use of the applicable editions and addenda of the ASME Code, Section XI, which are incorporated by reference in 10 CFR 50.55a. In the 2009 Edition of 10 CFR, the 1977 Edition through the 2004 Edition of the ASME Code, Section XI are incorporated by reference in 10 CFR 50.55a. Finally, 10 CFR 50.60(b) states that, "[p]roposed alternatives to the described requirements in Append[ix] G of this part or portions thereof may be used when an exemption is granted by the Commission under [10 CFR] 50.12."

In conjunction with the LAR for an extended power uprate (EPU), the licensee proposed to revise the P-T limits but did not propose to relocate the P-T limits from the Technical Specifications to a Pressure-Temperature Limits Report (PTLR). However, in Section 2.1.2 of the Licensing Report for the St. Lucie, Unit 1, EPU (Agencywide Documents Access and Management System (ADAMS) Accession No. ML103560429), the licensee referenced the basis document for the revised P-T limits. The basis document, included as Appendix G to the Licensing Report, is Westinghouse Commercial Atomic Power report WCAP-17197-NP

Revision 0, “St. Lucie Unit 1 RCS [reactor coolant system] Pressure and Temperature Limits and Low-Temperature Overpressure Protection Report [LTOP] for 54 Effective Full-Power Years” (ADAMS Accession No. ML103560511), which references Combustion Engineering (CE) Owners Group Topical Report CE NPSD-683-A, Revision 6, “Development of a RCS Pressure and Temperature Limits Report for the Removal of P-T Limits and LTOP Requirements from the Technical Specifications” (ADAMS Accession No. ML011350387), as the methodology for determining the P-T limits.

By letter dated March 3, 2011 (ADAMS Accession No. ML110660300), the licensee submitted a request for exemption from 10 CFR Part 50, Appendix G, regarding the P-T limits calculation. The licensee requested an exemption from the requirements of 10 CFR 50, Appendix G, to use the methodology of CE NPSD-683-A, Revision 6 as the basis for the developing the P-T limits. Specifically, the licensee requested an exemption from the requirements of 10 CFR 50, Appendix G, Section IV.A.2, because the P-T limits developed for St. Lucie, Unit 1, use a finite element method to determine the K_{Im} factors.

The NRC staff evaluated the specific PTLR methodology in CE NPSD-683, Revision 6. This evaluation was documented in the NRC safety evaluation (SE) of March 16, 2001 (ADAMS Accession No. ML010780017), which specified additional licensee actions that are necessary to support a licensee’s adoption of CE NPSD-683, Revision 6. The final approved version of this report was reissued as CE NPSD-683-A, Revision 6, which included the NRC SE and the required additional action items as an attachment to the report. One of the additional specified actions (#21) stated, “(applicable only if the CE NSSS [nuclear steam supply system] methods for calculating K_{Im} and K_{It} factors, as stated in Section 5.4 of CE NPSD-683, Revision 6, are being used as the basis for generating the P-T limits for their facilities) apply for an exemption against requirements of Section IV.A.2.of Appendix G to Part 50 to apply the CE NSSS methods

to their P-T curves." The action item further stated that, "This is consistent with the 'note' on page 5-15 of CE NPSD-683, Revision 6. Exemption requests to apply the CE NSSS to the generation of P-T limit curves should be submitted pursuant to the provision of 10 CFR 50.60(b) and will be evaluated on a case-by-case basis against the exemption request acceptance criteria of 10 CFR 50.12."

An exemption to use the methodology of CE NPSD-683-A to calculate the K_{It} factors is no longer necessary because editions and addenda of the ASME Code, Section XI, that have been incorporated by reference into 10 CFR 50.55a subsequent to the issuance of the final SE of CE NPSD-683-A, allow methods for determining the K_{It} factors that are equivalent to the methods described in CE NPSD-683-A.

If a licensee proposes to use the methodology in CE NPSD-683-A, Revision 6, for the calculation of K_{Im}, an exemption is required, since the methodology for the calculation of K_{Im} values in CE NPSD-683-A, Revision 6, cannot be shown to be equally or more conservative than the methodology for the determination of K_{Im} provided in editions and addenda of the ASME Code, Section XI, Appendix G, through the 2004 Edition. Therefore, the licensee submitted an exemption request, consistent with the requirements of 10 CFR 50.12 and 50.60, to apply the K_{Im} calculational methodology of CE NPSD-683-A, Revision 6 in the development of the St. Lucie, Unit 1, P-T limits. During the NRC staff's review of CE NPSD-683, Revision 6, the NRC staff evaluated the K_{Im} calculational methodology of that report versus the methodologies for the calculation of K_{Im} given in the ASME Code, Section XI, Appendix G. In the NRC's March 16, 2001, SE the staff noted, "[t]he CE NSSS methodology does not invoke the methods in the 1995 edition of Appendix G to the Code for calculating K_{Im} factors, and instead applies FEM [finite element modeling] methods for estimating the K_{Im} factors for the RPV [reactor pressure vessel] shell ... the staff has determined that the K_{Im} calculation methods apply FEM modeling

that is similar to that used for the determination of the K_{It} factors [as codified in the ASME Code, Section XI, Appendix G]. The staff has also determined that there is only a slight nonconservative difference between the P-T limits generated from the 1989 edition of the ASME Code, Section XI, Appendix G, and those generated from CE NSSS methodology as documented in CE/ABB Evaluation 063-PENG-ER-096, Revision 00, 'Technical Methodology Paper Comparing ABB/CE PT Curve to ASME Section III, Appendix G,' dated January 22, 1998 (ADAMS Accession No. ML100500514, nonproprietary version). The staff considers that this difference is reasonable and that it will be consistent with the expected improvements in P-T generation methods that have been incorporated into the 1995 edition of Appendix G to the Code." This conclusion regarding the comparison between the CE NSSS methodology and the 1995 Edition of the ASME Code, Section XI, Appendix G, methodology also applies to the 2004 Edition of the ASME Code, Section XI, Appendix G, methodology because there were no significant changes in the method of calculating the K_{Im} factors required by the ASME Code, Section XI, Appendix G, between the 1995 edition (through 1996 addenda) and the 2004 editions of the ASME Code. In summary, the staff concluded in its March 16, 2001, SE that the calculation of K_{Im} using the CE NPSD-683, Revision 6 methodology would lead to the development of P-T limit curves that may be slightly nonconservative with respect to those that would be calculated using the ASME Code, Section XI, Appendix G, methods, and that such a difference was to be expected with the development of more refined calculational techniques. Furthermore, the staff concluded in its March 16, 2001, SE that P-T limit curves that would be developed using the methodology of CE NPSD-683, Revision 6, would be adequate for protecting the RPV from brittle fracture under all normal operating and hydrostatic/leak test conditions.

3.0 Discussion

Pursuant to 10 CFR 50.12, the Commission may, upon application by any interested person or upon its own initiative, grant exemptions from the requirements of 10 CFR Part 50 when (1) the exemptions are authorized by law, will not present an undue risk to public health or safety, are consistent with the common defense and security; and (2) when special circumstances are present.

Authorized by Law

This exemption allows the use of an alternative methodology for calculating flaw stress intensity factors in the RPV due to membrane stress from pressure loadings in lieu of meeting the requirements in 10 CFR 50.60 and 10 CFR Part 50, Appendix G. As stated above, 10 CFR 50.12 allows NRC to grant exemptions from the requirements of 10 CFR Part 50. In addition, the granting of the exemption will not result in violation of the Atomic Energy Act of 1954, as amended, or the Commission's regulations. Therefore, the exemption is authorized by law.

No Undue Risk to Public Health and Safety

The underlying purpose of 10 CFR 50.60 and 10 CFR Part 50, Appendix G, is to provide an acceptable margin of safety against brittle failure of the RCS during any condition of normal operation to which the pressure boundary may be subjected over its service lifetime. Appropriate P-T limits are necessary to achieve this underlying purpose. The licensee's alternative methodology for establishing the P-T limits and the LTOP setpoints is described in CE NPSD-683-A, Revision 6, which has been approved by the NRC staff. Based on the above, no new accident precursors are created by using the alternative methodology. Thus, the probability of postulated accidents is not increased. Also, based on the above, the consequences of postulated accidents are not increased. In addition, the licensee used an

NRC-approved methodology for establishing P-T limits and minimum permissible temperatures for the RPV. Therefore, there is no undue risk to the public health and safety.

Consistent with Common Defense and Security

The exemption results in changes to the plant by allowing an alternative methodology for calculating flaw stress intensity factors in the RPV. This change to the calculation of stress intensity factors in the RPV material has no negative implications for security issues. Therefore, the common defense and security is not impacted by this exemption.

Special Circumstances

Special circumstances, pursuant to 10 CFR 50.12(a)(2)(ii), are present in that continued operation of St. Lucie, Unit 1, with P-T limit curves developed in accordance with the ASME Code, Section XI, Appendix G, is not necessary to achieve the underlying purpose of 10 CFR Part 50, Appendix G. Application of the K_{Im} calculational methodology of CE NPSD-683-A, Revision 6, in lieu of the calculational methodology specified in the ASME Code, Section XI, Appendix G, provides an acceptable alternative evaluation procedure that will continue to meet the underlying purpose of 10 CFR Part 50, Appendix G. The underlying purpose of the regulations in 10 CFR Part 50, Appendix G, is to provide an acceptable margin of safety against brittle failure of the reactor coolant system during any condition of normal operation to which the pressure boundary may be subjected over its service lifetime. Based on the staff's March 16, 2001, SE regarding CE NPSD-683, Revision 6, and the licensee's rationale to support the exemption request, the staff determined that an exemption is required to approve the use of the K_{Im} calculational methodology of CE NPSD-683-A, Revision 6. The staff concludes that the application of the K_{Im} calculational methodology of CE NPSD-683-A, Revision 6, for St. Lucie, Unit 1, provides sufficient margin in the development of RPV P-T limit curves such that the underlying purpose of the regulations (10 CFR Part 50, Appendix G) continues to be met.

Therefore, the NRC staff concludes that the exemption requested by the licensee is justified based on the special circumstances of 10 CFR 50.12(a)(2)(ii), "[a]pplication of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule." Based upon a consideration of the conservatism that is incorporated into the methodologies of 10 CFR Part 50, Appendix G, and ASME Code, Section XI, Appendix G, the staff concludes that application of the K_{Im} calculational methodology of CE NPSD-683-A, Revision 6, as described, would provide an adequate margin of safety against brittle failure of the RPV. Therefore, the staff concludes that the exemption is appropriate under the special circumstances of 10 CFR 50.12(a)(2)(ii), and that the application of the K_{Im} calculational methodology of CE NPSD-683-A, Revision 6, is acceptable for use as the basis for generating the St. Lucie, Unit 1, P-T limits.

4.0 Conclusion

Accordingly, the Commission has determined that, pursuant to 10 CFR 50.12(a), the exemption is authorized by law, will not present an undue risk to the public health and safety, and is consistent with the common defense and security. Also, special circumstances are present. Therefore, the Commission hereby grants FPL an exemption from the requirements of 10 CFR Part 50, Appendix G, to allow application of the K_{Im} calculational methodology of CE NPSD-683-A, Revision 6, as the basis for the St. Lucie, Unit 1, P-T limits.

Pursuant to 10 CFR 51.32, the Commission has determined that the granting of this exemption will not have a significant effect on the quality of the human environment (76 FR 53497; dated August 26, 2011). This exemption is effective upon issuance.

Dated at Rockville, Maryland, this 5th day of December 2011.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

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